

CLAIMS

1. An orientable longitudinal structure (1) comprising substantially longitudinal actuators made of shaped memory alloy, n-doped and p-doped Peltier elements (4, 5) and electric operating means, characterized in that said actuators are arranged in pairs and positioned antagonistically, each actuator being in contact substantially at its ends with an n-doped Peltier element (4) and a p-doped Peltier element (5) respectively.
2. The orientable longitudinal structure (1) as claimed in claim 1, characterized in that said actuators are leaves (2, 3), preferably one-piece leaves.
3. The orientable longitudinal structure as claimed in claim 1 or as claimed in claim 2, characterized in that each n-doped (4) and p-doped (5) Peltier element is in contact with a partially annular conducting element (6, 7), preferably made of copper.
4. The orientable longitudinal structure as claimed in claim 3, characterized in that each n-doped (4) and p-doped (5) Peltier element is welded to said conducting element (6, 7).
5. The orientable longitudinal structure as claimed in any one of claims 1 to 4, characterized in that said actuators, associated with the Peltier elements (4, 5), are positioned diametrically opposite each other with respect to

the longitudinal axis of the structure (1).

6. The orientable longitudinal structure (1) as claimed in any one of the preceding claims, characterized in that said actuators are welded to said n-doped and p-doped Peltier elements (4, 5).

7. The orientable longitudinal structure (1) as claimed in any one of the preceding claims, characterized in that said actuators are made of nickel titanium (NiTi) alloy.

8. The orientable longitudinal structure (1) as claimed in any one of the preceding claims, characterized in that said Peltier elements (4, 5) are made of bismuth telluride.

9. The orientable longitudinal structure (1) as claimed in any one of the preceding claims, characterized in that said structure (1) further comprises epoxy resin (8) covering said Peltier elements (4, 5) including the thermoelectric junctions (j2, j3, j6, j7) with said actuators.

10. An endoscope comprising a longitudinal body (9) having, at its distal end, a viewing system, characterized in that at least part of the longitudinal body (9) is formed using at least one orientable longitudinal structure (1) as claimed in any one of the preceding claims.

11. The endoscope as claimed in the preceding claim, characterized in that at least part of the longitudinal body (9) is formed of a plurality of orientable structures (1), said structures (1) being stacked on top of one another in such a way that the conducting element of one of said

structures (1) bearing the n-doped elements is adjacent to the conducting element bearing the p-doped Peltier elements of the previous structure (1).

12. The endoscope as claimed in claim 10 or claim 11, characterized in that the actuators of at least one structure (1) present, with the actuators of a previous and/or next structure (1), deformations in different directions.

13. A method of manufacturing an orientable longitudinal structure (1) as claimed in any one of claims 2 to 9, characterized in that said method comprises, in succession:

- a step of preparing SMA actuators consisting in cutting leaves (2, 3) presenting a curved shape from a sheet of SMA, preferably made of NiTi, said curved shape of the leaves (2, 3) corresponding to a "memorized" shape;
- a step of cooling said leaves (2, 3) until substantially straight leaves (2, 3) are obtained;
- a step of assembling said leaves (2, 3) obtained during the previous step with said Peltier elements (4, 5), said assembly step consisting in incorporating said leaves (2, 3) between said n-doped and p-doped Peltier elements (4, 5).

14. The manufacturing method as claimed in the preceding claim, characterized in that it further comprises a step of assembling said Peltier elements (4, 5) with partially annular conducting elements (6, 7), preferably made of copper.

15. The manufacturing method as claimed in claim 13 or

claim 14, characterized in that the assembly steps consist in a welding operation.

16. The manufacturing method as claimed in any one of claims 13 to 15, characterized in that said method further comprises a step of pouring resin (8) to cover said Peltier elements (4, 5), including the thermoelectric junctions (j2, j3, j6, j7) with said actuators.